

AP6684S/Stream1977 OEM instruction manual

Stamp-type WiFi/BT module

Network Audio Streaming Module

Linux SOM with Wi-Fi 7, Dual-Mode BT, LE Audio

Instructions for FCC/IC/MIC/RED compliant integration into host products

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1. Document History

No.	Primary Author(s)	Description of Version	Date Completed
1.0	C. Arnardi	Initial version	08/06/2026
1.1	C. Apel	Improve structure, add <i>Instructions for module integrators</i> with restrictions for product use-cases	26/09/2026
1.2	C. Apel	Rename document, extend to cover requirements of FCC KDB Publication 987594 D01 , split requirements into different regulatory domains	09/10/2026
1.3	Richard . Wu	Add description for 6VL.	19/10/2026
1.4	Richard . Wu	Add LPI module requirement.	22/10/2026

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1. Instructions for module integrators

This transmitter module is intended to be used by OEM integrators to create finished products. OEM integrators **must** fulfil below requirements to be able to benefit from modular certificates.

AP6684S is a stamp-type Wi-Fi/BT module. It was certified as a modular transmitter.

Stream1977 module combines AP6684S with host processor and memory and was used for certification testing of AP6684S.

2. Requirements for using modular FCC approval

2.1 Additional testing, Part 15 Subpart B disclaimer

This module was tested and certified for following standards for different wireless operating modes:

FCC CFR Title 47, Part 15, Subpart C	Bluetooth Classic
FCC CFR Title 47, Part 15, Subpart C	Bluetooth LE
FCC CFR Title 47, Part 15, Subpart C	2.4GHz Wi-Fi 802.11 b/g/n/ax/be
FCC CFR Title 47, Part 15, Subpart E	5GHz Wi-Fi 802.11 a/n/ac/ax/be incl. DFS slave
FCC CFR Title 47, Part 15, Subpart E	6GHz Wi-Fi 802.11 ax/be (6VL+Client mode)

the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification such as FCC CFR Title 47, Part 15, Subpart B since any host product contains unintentional-radiator digital circuitry. For more detailed guidance, please refer to KDB996369 D04 for OEM Integrators.

2.2 Description for 6VL

STA in 6G-VLP mode is not allowed to send out probe requests before seeing FILS/UPR or RNR. There is no so-called priority for channel operation impacts the regulatory requirement as STA only do passive scan. FILS/UPR and RNR all coming from Aps

2.3 EMI Considerations

See section "EMI application notes"

2.4 Antenna types and placement

The module antenna(s) must be installed to meet the RF exposure compliance separation distance of 20 cm from all persons. End customer should be notified of this requirement in case it cannot be fulfilled by the mechanical construction of the product alone.

The "Recommended antennas specifications" must be followed (see AP6684S_Generic_Antenna_Specification.pdf)

2.5 Output power configuration and configuration of used channels

Products sold in US must be factory-provisioned for US region to restrict power levels and supported channels to match modular certification and FCC rules.

A secure firmware update mechanism must be used to prevent modification of the update image. The product must also be protected against local access to the software.

Wi-Fi region or Wi-Fi and Bluetooth transmit power by end user must not be configurable by the end user.

2.6 Co-location with other transmitters

Co-location of this module with other transmitters that operate simultaneously are required to be evaluated using the FCC multi-transmitter procedures.

2.7 End-user manual requirements

The end-user manual must not provide information to the end user regarding how to install or remove this module.

The end-user manual must inform that operation in the band 5150–5350 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.

Furthermore it must inform that operation in the band 5925–7125MHz is only for indoor use as well due to FCC regulations for 6XD devices.

Instructions for use must contain warnings and customer information as below.

FCC compliance statements in end-user manual

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications or changes to this equipment. Such modifications or changes could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help

2.8 FCC Packaging and labelling requirements

- If there is no FCC 15 warning on the label, please add it to the outer packaging :

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

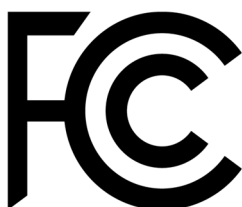
(1) this device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

- the final end product must be labelled in a visible area with the following: “Contains, FCC ID: ZQ6-AP6684S”. The grantee's FCC ID must only be used when all FCC compliance requirements are met. Example:



2.9 Compliance Logo Template



3. Requirements for using modular IC approval:

3.1 Additional testing disclaimer

This module was tested and certified for following standards for different wireless operating modes:

RSS-Gen, Issue 5, Amendment 2, Feb. 2021	all wireless operating modes
RSS-102, Issue 6, Dec. 2023	all wireless operating modes (human exposure)
RSS-247, Issue 4, Jul. 2025	Bluetooth Classic
RSS-247, Issue 4, Jul. 2025	Bluetooth LE
RSS-247, Issue 4, Jul. 2025	2.4GHz Wi-Fi 802.11 b/g/n/ax/be
RSS-247, Issue 4, Jul. 2025	5GHz Wi-Fi 802.11 a/n/ac/ax/be incl. DFS slave
RSS-248, Issue 3, Oct. 2024	6GHz Wi-Fi 802.11 ax/be

The host product manufacturer is responsible for compliance to any other IC rules that apply to the host not covered by the modular transmitter grant of certification such as ICES-003 class B since any host product contains unintentional-radiator digital circuitry.

3.2 EMI Considerations

See section "EMI application notes"

3.3 Antenna types and placement

The module antenna(s) must be installed to meet the RF exposure compliance separation distance of 20 cm from all persons. End customer should be notified of this requirement in case it cannot be fulfilled by the mechanical construction of the product alone.

The "Recommended antennas specifications" must be followed (see AP6684S_Generic_Antenna_Specification.pdf)

For devices with detachable antenna(s), the maximum antenna gain permitted for devices in the bands 5250-5350 MHz and 5470-5725 MHz shall be such that the equipment still complies with the e.i.r.p. limit; For devices with detachable antenna(s), the maximum antenna gain permitted for devices in the band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits specified for point-to-point and non-point-to-point operation as appropriate.

3.4 Output power configuration and configuration of used channels

Products sold in Canada must be factory-provisioned for Canada region to restrict power levels and supported channels to match modular certification and IC rules.

A secure firmware update mechanism must be used to prevent modification of the update image. The product must also be protected against local access to the software. Wi-Fi region or Wi-Fi and Bluetooth transmit power by end user must not be configurable by the end user.

3.5 Co-location with other transmitters

Co-location of this module with other transmitters that operate simultaneously are required to be evaluated with respect to Industry Canada requirements for compliance of the combined radiation to RSS-247 and RSS-248 (if applicable).

3.6 End-user manual requirements

Instructions for use must contain warnings and customer information as below unless if they obviously do not apply to the product category.

Should any of below restrictions limit the commercial use of the product, please approach AMPAK regarding disabling of frequency bands to remove this restriction.

Canada compliance statements

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s).

Operation is subject to the following two conditions:

- (1) This device may not cause interference.
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

This device shall not be used for control of or communications with unmanned aircraft systems.

This device shall not be used on oil platforms.

This device shall not be used on aircraft, automobiles, trains and maritime vessels.

Operation shall be limited to indoor use only.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence.

L'exploitation est autorisée aux deux conditions suivantes:

- 1) L'appareil ne doit pas produire de brouillage;
- 2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

L'appareil ne doit pas être utilisé pour la commande de systèmes d'aéronefs sans pilote ou pour communiquer avec ceux-ci.

L'appareil ne doit pas être utilisé sur des plates-formes pétrolières.

L'appareil ne doit pas être utilisé à bord d'aéronefs, d'automobiles, de trains ou de navires.

L'utilisation doit se limiter exclusivement aux environnements intérieurs.

The device meets compliance with RSS-102 RF exposure, users can obtain Canadian information on RF exposure and compliance.

Le dispositif rencontre la conformité à l'exposition de RSS-102 rf, utilisateurs peut obtenir l'information canadienne sur l'exposition et la conformité de rf.

The device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.

Les dispositifs fonctionnant dans la bande 5150-5250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux;

Caution!

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

Cet émetteur ne doit pas être Co-placé ou ne fonctionnant en même temps qu'aucune autre antenne ou émetteur.

Cet équipement devrait être installé et actionné avec une distance minimum de 20 centimètres entre le radiateur et votre corps

3.6 IC labelling requirements

Product label must contain following text:
“contains IC:11956A-AP6684S”

See below example for reference



3.7 Compliance Logo Template

IC

4. Requirements for using modular RED approval:

4.1 Additional testing disclaimer

This module was tested and certified for following standards for different wireless operating modes:

EN 50665:2017	human exposure for all modes
EN IEC 62311:2020	human exposure for all modes
ETSI EN 300 328 V2.2.2 (2019-07)	Bluetooth Classic
ETSI EN 300 328 V2.2.2 (2019-07)	Bluetooth LE
ETSI EN 300 328 V2.2.2 (2019-07)	2.4GHz Wi-Fi 802.11 b/g/n/ax/be
ETSI EN 301 893 V2.2.1 (2024-11)	5GHz Wi-Fi 802.11 a/n/ac/ax/be incl. DFS slave
ETSI EN 303 687 V1.1.1 (2023-06)	6GHz Wi-Fi 802.11 ax/be

the host product manufacturer is responsible for compliance to any other RED rules that apply to the host not covered by the modular transmitter grant of certification such as ETSI EN55032 and ETSI EN55033 since any host product contains unintentional-radiator digital circuitry.

4.2 EMI Considerations

See section "EMI application notes"

4.3 Antenna types and placement

The module antenna(s) must be installed to meet the RF exposure compliance separation distance of 20 cm from all persons. End customer should be notified of this requirement in case it cannot be fulfilled by the mechanical construction of the product alone. The “Recommended antennas specifications” must be followed (see AP6684S_Generic_Antenna_Specification.pdf)

4.4 Output power configuration and configuration of used channels

It is recommended to factory-provision products for EU region to configure output power levels and parameters for scanning for networks for best wireless performance. If no region is configured, the standard software implementation will choose safe values which are legally compliant but may not deliver best wireless performance. A secure firmware update mechanism must be used to prevent modification of the update image. The product must also be protected against local access to the software. Wi-Fi region or Wi-Fi and Bluetooth transmit power by end user must not be configurable by the end user.

4.5 Co-location with other transmitters

Co-location of this module with other transmitters that operate simultaneously are required to be evaluated with respect to intermodulation or other interference between the transmitters as described in ETSI EG 203 367.

4.6 End-user manual requirements

Instructions for use must contain warnings and customer information as below unless if they obviously do not apply to the product category. Should any of below restrictions limit the commercial use of the product, please approach AMPAK regarding disabling of frequency bands to remove this restriction. The end-user manual must not provide information to the end user regarding how to install or remove this module. The end-user manual must inform that operation in the band 5150–5350 MHz as well as operation in the band 5925–7125MHz is only for indoor use inside buildings to reduce the potential for harmful interference to satellite systems and other wireless infrastructure.

More details are provided below and can be used if above statement is considered too restrictive (see also European Commission CEPT Report 79 and COMMISSION IMPLEMENTING DECISION (EU) 2021/1067):

Frequency band: 5150 – 5250 MHz:

Indoor use: Inside buildings only. Installations and use inside road vehicles and train carriages are not permitted. Limited outdoor use: If used outdoors, equipment shall not be attached to a fixed installation or to the external body of road vehicles, a fixed infrastructure or a fixed

outdoor antenna. Use by unmanned aircraft systems (UAS) is limited to within the 5170 – 5250 MHz band.

Frequency band: 5250 – 5350 MHz:

Indoor use: Inside buildings only. Installations and use in road vehicles, trains and aircraft are not permitted. Outdoor use is not permitted.

Frequency band: 5470 – 5725 MHz:

Installations and use in road vehicles, trains and aircraft and use for unmanned aircraft systems (UAS) are not permitted.

Frequency band: 5945 – 6425 MHz:

Restricted to indoor use only (including trains where metal coated windows are fitted and aircraft). Outdoor use (including in road vehicles) is not permitted. Use on unmanned aircraft systems is prohibited.

4.7 EU labelling requirements

- CE logo needs to be shown on the product labelling (must not be smaller than 5 mm).
- Trademark and model name/ number needs to be shown.
- Manufacturer full address to be shown or – if not possible – shown in end-user manual
- Importer full address to be shown or – if not possible – shown in end-user manual
- 5G restriction diagram to be shown or – if not possible – shown in end-user manual

	AT	BE	BG	CH	CY	CZ	DE	DK
	EE	EL	ES	FI	FR	HR	HU	IE
	IS	IT	LI	LT	LU	LV	MT	NL
	NO	PL	PT	RO	SE	SI	SK	UKNI

4.8 Compliance Logo Template



5. Requirements for using modular MIC approval

5.1 Additional testing disclaimer

This module was tested and certified for following standards for different wireless operating modes:

MIC Article 2 Clause 1 item 19/ Notice 88 Appendix 43	Bluetooth Classic
MIC Article 2 Clause 1 item 19/ Notice 88 Appendix 43	Bluetooth LE
MIC Article 2 Clause 1 item 19/ Notice 88 Appendix 43	2.4GHz Wi-Fi 802.11 b/g/n/ax/be
MIC Article 2 Clause 1 item 19-3/Notice 88 Appendix 45	5GHz Wi-Fi 802.11 a/n/ac/ax/be
MIC Article 2 Clause 1 item 80	6GHz Wi-Fi 802.11 ax/be

the host product manufacturer is responsible for compliance to any other MIC rules that apply to the host not covered by the modular transmitter grant of certification since any host product contains unintentional-radiator digital circuitry.

5.2 LPI mode

For a LPI module, user manual shall contain how the host product integrated module complies the following requirement:

- (1) antenna shall have an inseparable structure and does not have a function that can connect to outside the housing an external antenna other than the antenna;
- (2) the equipment operates only by AC power source supplied from the outside of the housing via a cable;
- (3) the equipment does not have weather resistance for the purpose of outdoor use.

5.3 EMI Considerations

See section "EMI application notes"

5.4 Antenna types and placement

The module antenna(s) must be installed to meet the RF exposure compliance separation distance of 20 cm from all persons. End customer should be notified of this requirement in case it cannot be fulfilled by the mechanical construction of the product alone.

The "Recommended antennas specifications" must be followed (see AP6684S_Generic_Antenna_Specification.pdf)

5.5 Output power configuration and configuration of used channels

Products sold in Japan must be factory-provisioned for Japan region to restrict power levels and supported channels to match modular certification and MIC rules.

A secure firmware update mechanism must be used to prevent modification of the update image. The product must also protected against local access to the software.

Wi-Fi region or Wi-Fi and Bluetooth transmit power by end user must not be configurable by the end user.

5.6 Co-location with other transmitters

Co-location of this module with other transmitters that operate simultaneously are required to be evaluated with respect to intermodulation or other interference between the transmitters.

5.7 MIC labelling requirements

The final end product must be labelled in a visible area with the following: “Contains MIC ID” followed by MIC ID of the module. Example:



5.8 End-user manual requirements

End user must be notified that frequency band 5150MHz – 5250MHz must only be used indoor to avoid interference with mobile satellite communications.

End user must be notified that frequency band 5250MHz – 5350MHz must only be used indoor to avoid interference with fixed and meteorological radar systems.

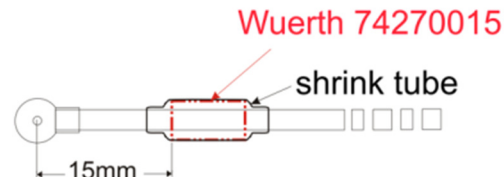
5.9 Compliance Logo template



6. EMI application notes

Consider following recommendations when designing application boards:

- Use a GND plane underneath the module
- Use series resistors in all low speed interface lines, values need to be chosen depending on signal frequency and length of signal lines on application board
- Use common mode signal filters in USB data lines, e.g. Wuerth 744232161.
- Prevent using vias in high speed interface lines such as MIPI, USB and Ethernet
- Route high speed interface lines differentially and leave several mm gap to other signal lines when possible
- Make sure any interface which is not needed for your application is disabled in software
- **Type and orientation of antennas and routing of antenna cables will influence spurious emission. A compliance test w.r.t. EN301 893 is recommended on product level earliest possible in the development phase**
- in case the WLAN antennas radiate undesired disturbances originating from either the module itself or other parts of the product, using a ferrite on the antenna cables may help to improve EMC (see below picture for reference).



7. Other application notes

- Decouple the module supply from functional blocks, which are sensitive to supply ripple. The WLAN subsystem will draw up to 1200mA (Peak) while transmitting at high data rate but switch to low power mode rapidly whenever idle. A large low-ESR capacitor (100uF) is recommended to be placed close to the module with a ferrite bead or inductor towards sensitive circuitry such as audio ADCs or DACs. Using 3x47µF ceramic capacitors in parallel will reduce disturbance currents further
- Use of an external 5V AC/DC adapter is not recommended, since current peaks of WLAN subsystem would cause high voltage drops across the D.C. cable and connector which may cause malfunction of USB ports. It is recommended to use a 12V AC/DC adapter and local 5V DC/DC converter or internal SMPS.